

## STUDIES IN MACHAERIUM (LEGUMINOSAE) VI.

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Machaerium is a genus of neotropical, papilionoid legumes known from México southward to Perú and Argentina, with one species extending into the Antilles and to the west coast of Africa.

It appears to be most closely related to Dalbergia with which it is frequently confused. Machaerium differs in having stamens with anthers dorsifixed rather than basifixed as in Dalbergia, and fruit usually with a basal seed and a terminal wing. In the species with lunate or reniform fruit, lacking an extended wing, the seed is near the base. The fruits of Dalbergia lack a terminal wing, are sometimes orbiculate, sometimes oblong, many-seeded, and, if lunate, the seeds are more or less centrally placed. For more contrasting characters see T. Baretta-Kuipers, 1971 (Acta Bot. Neerl. 20(6): 655-662).

### Systematic Treatment

MACHAERIUM Persoon, Syn. Pl. 2: 276. 1807, nom. cons.

Lectotype species: M. ferrugineum (Willdenow) Persoon, based on Nissolia ferruginea Willdenow, Sp. Pl. 3(2): 900. 1802, based on Nissolia quinata Aublet, Fl. Guian. 2: 743, t. 297. 1775 = Machaerium quinata (Aublet) Sandwith, Kew Bull. 1931: 359. 1931. (Lectotype designated by Burkart, Leg. Arg. 543. 1943). For additional synonymy see Taxon 18(5): 593. 1969.

Trees, shrubs, or lianas, armed with spinescent stipules or unarmed; stipules lacking. Leaves alternate, imparipinnate, with few to many leaflets. Leaflets alternate, small to moderately large. Inflorescences racemose or paniculate, terminal or axillary; bracts usually small, caducous, sometimes spinescent and persistent; bracteoles usually small, paired at the base of the calyx. Flowers papilionoid, small to medium in size; calyx campanulate with 5 subequal lobes, petals 5, white to yellow, pink, blue, or purple, glabrous or pubescent; stamens 10 with the filaments connate at the base, sometimes separating into two fascicles of 5 stamens each or with the vexillar stamen separate, at least at the base; anthers small, elliptic, dorsifixed; ovary brevistipitate with 1 or 2 ovules; style filiform, somewhat incurved; stigma minute, capitate, terminal. Fruit laterally compressed, usually 1-seeded, samaroid with a basal seed and a terminal wing, or lunate to reniform with the wing reduced or lacking; seed compressed, ovate, orbicular, or reniform. 2n = 20.

It is sometimes confusing that a species is variously cited as tree, shrub, or liana. Small specimens of about 1-2 m tend to be reported by collectors as shrubs. Taller plants, standing alone, may remain erect and tree-like. Others, with weaker stems, become leaners and eventually climbers. Many species produce "searcher-shoots" or "explorer-shoots" armed with recurved spines that hook on to adjacent plants and continue as high climbing lianas.

## SECTION I. MACHAERIUM

The five series, or sections, into which the genus *Machaerium* has been divided are partly natural and partly artificial. There is some intergradation between the groups. Possibly this accounts for Bentham's preferring to designate them as series rather than as sections.

I have found it convenient to recognize four sections: *Machaerium* (*Penninervia*); *lineata*; *Oblonga*; and *reticulata*, including *Acuti'olia*.

## Key to sections

Leaflets with venation craspedodromous, the secondary veins approximately parallel, usually well defined, extending to the margin, or nearly so.

Secondary veins about 3-25 mm apart. . . . Section I. *Machaerium*

Secondary veins crebrous, about 1 mm apart. Section II. *Lineata*

Leaflets with venation camptodromous, the secondary veins not extending to the margin, sometimes weakly defined.

Shape of leaflets preacominantly oblong or elliptic and relatively small. . . . . Section III. *Oblonga*

Shape of leaflets predominantly ovate, sometimes lanceolate or oblong, usually larger than in Section *Oblonga* . . . . .  
Section IV. *reticulata*

## MACHAERIUM PERS. SECTION I. MACHAERIUM

*Machaerium* Pers. series *Penninervia* Benth. Jour. Linn. Soc.4, suppl.: 54, 67. 1860. Lectotype species: *M. ferrugineum* (Willd.) Pers., a synonym of *M. quinata* (Aubl.) Sandw.

*Machaerium* Pers. section *Penninervia* (Benth.) Taubert, in Engler and Prantl., Natürl. Pflanzenfam. 3(3): 337. 1894.

Trees, shrubs, or lianas, commonly armed with spinescent stipules; leaflets relatively large, about 3-26 cm long with craspedodromous venation, the secondary veins usually well defined, about 3-25 mm apart, extending to the margin or nearly so; fruit alate with a terminal wing to wingless, lunate-reniform to falcate; stamens monadelphous or with a tendency toward diadelphly with the vexillar filament separate, sometimes varying within the same species.

Only five of the eight species included in Bentham's original series *Penninervia* are being retained in this present treatment. The species retained are: *M. ferrugineum*, a synonym of *M. quinata*; *M. floribundum*; *M. lindenianum*; *M. macrophyllum*; and *M. nigrum*. The three excluded species, *M. eriostemon*, a synonym of *M. violaceum*, *M. kegelii*, and *M. lanatum*, a synonym of *M. villosum*, are now transferred to section *reticulata*. The latter species is more or less intermediate, with leaflets of a few specimens showing a tendency toward both types of venation; most specimens, however, appear to be most closely related to species in section *reticulata*.

KEY TO SPECIES OF SECTION MACHAERITUM

1. Lower surface of leaflets with hairs lax or crispate, not short, appressed; stamens monadelphous; fruit pubescent, sometimes glabrescent with age.
  2. Fruit alate with the wing about 2-4 times the length of the seminiferous body.
    3. Flowers 7-17 mm long; calyx 2.5-6 mm long; fruit straight or slightly curved.
      4. Pubescence generally fulvous or ferruginous; flowers 7-17 mm long on pedicels about 1-5 mm long; calyx tomentulose or velutinous, not noticeably striate.
        5. Vexillum pubescent; flowers 8-17 mm long on pedicels 1-3 mm long; calyx 2.5-6 mm long, 2-4 mm in diameter; bracteoles broadly ovate to suborbicular.
          6. Flowers about 12-17 mm long; calyx 4-6 mm long, 3-4 mm in diameter; bracteoles 2-3 mm long, 3-4 mm wide. Martinique, introduced; Venezuela; Guyana; Surinam; French Guiana; Brazil . . . . .
            - la. M. quinata var. quinata
          6. Flowers about 8-12 mm long; calyx 2.5-3 mm long, 2-3 mm in diameter; bracteoles 1-2 mm long, 1.5-2.5 mm wide. Colombia; Venezuela; French Guiana; Brazil . . . . .
            - lb. M. quinata var. parviflorum
          5. Vexillum glabrous or nearly so; flowers 7-10 mm long on pedicels about 5 mm long; calyx 3-3.5 mm long, 2.5 mm in diameter; bracteoles lanceolate to oblong. Colombia; Venezuela. . .
            3. M. lindenianum
        4. Pubescence generally sordid; flowers 7-10 mm long, sessile; calyx sericeous, strongly striate. Brazil . . .
          4. M. nigrum
      3. Flowers 5-6 mm long, essentially sessile; calyx 2-2.5 mm long; fruit more or less sigmoid. Brazil . . .
        5. M. piresii
    2. Fruit lunate-reniform, wingless. Colombia; Peru; Brazil. . .
      2. M. duckeanum
1. Lower surface of leaflets glabrous or with hairs appressed and usually minute; stamens monadelphous or diadelphous, 5:5 or 9:1; fruit pubescent or glabrous.
  7. Leaflets obovate to elliptic.
    8. Fruit alate; flowers 5-7 mm long; calyx 2.5-3 mm long, 1.5-2 mm in diameter. Colombia; Perú; Venezuela; Guyana; Surinam; Brazil. . .
      - 6a. M. macrophyllum var. macrophyllum
    8. Fruit reniform or with a short, wide wing; flowers 8-12 mm long; calyx 3-5 mm long, 2.5-3 mm in diameter. Brazil. . .
      - 6b. M. macrophyllum var. brevialetatum
  7. Leaflets predominantly ovate to elliptic.
    10. Fruit alate or subreniform, fulvo- or ferrugineo-puberulent, sometimes glabrescent with age, usually light brown when dry, stipe about 3-5 mm long; calyx sericeous; bracteoles densely pubescent, about half as long as the calyx or less; leaflets usually not blackening on drying.

11. Flowers about 6-10 mm long; calyx 3-4 mm long, 2-2.5 mm in diameter; leaflets sericeous to sparsely pubescent with short, appressed hairs to subglabrous on the lower surface; fruit alate. México southward to Colombia; Venezuela; Guyana; French Guiana; Brazil; Perú. . . . . 7a. *M. floribundum* var. *floribundum*
11. Flowers about 4-6 (-7) mm long; calyx 2-2.5 mm long, 1-2 mm in diameter; leaflets sericeous to moderately pubescent on the lower surface.
12. Leaflets fulvo- or ferrugineo-sericeous beneath, sometimes glabrescent; fruit falcate-subreniform. Perú; Bolivia. 7b. *M. floribundum* var. *parviflorum*
12. Leaflets silvery-sericeous beneath; fruit not known. Perú. 7c. *M. floribundum* var. *hypergyreum*
10. Fruit alate, glabrous, usually black when dry, stipe about 10-15 mm long; calyx ciliolate, otherwise glabrous; bracteoles glabrous, ciliolate, usually slightly longer than the calyx; leaflets usually blackening on drying. Colombia; Venezuela; Surinam; French Guiana; Brazil. . . 8. *M. paraense*

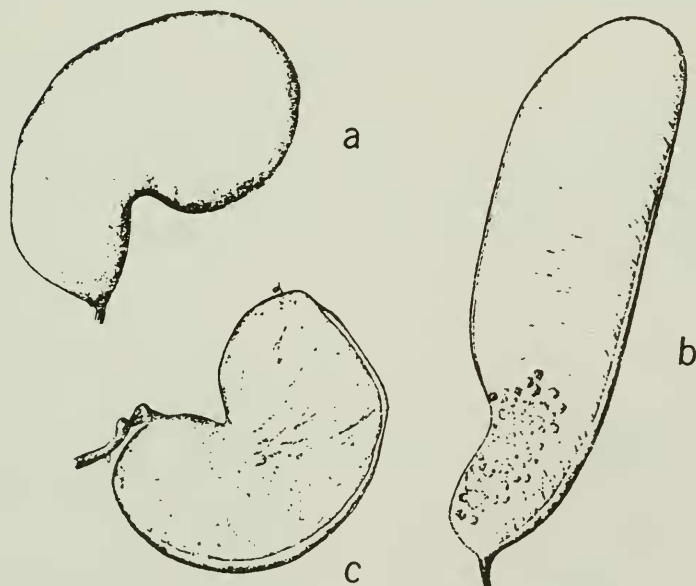


Figure 1. Fruit of: a. *Machaerium macrophyllum* var. *brevialatum*; b. *M. quinata* var. *quinata*; c. *M. duckeanum* (from Ducke in Arch. Jard. Bot. Rio 5: 134, pl. 11, figs. 15, 17, 18. 1930).

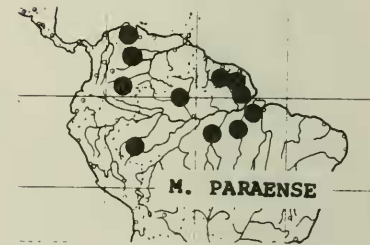
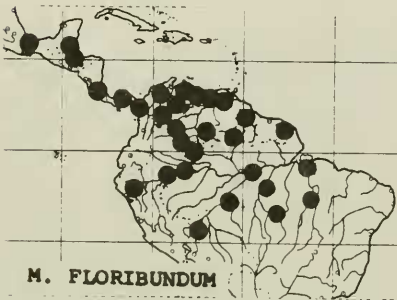
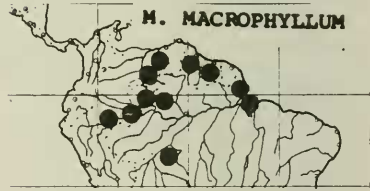
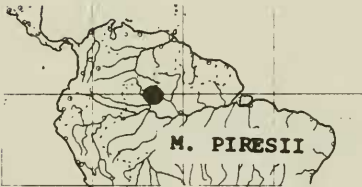
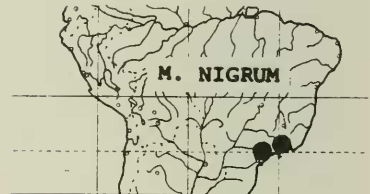
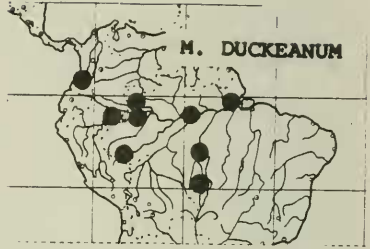
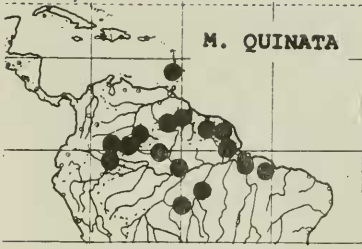


Figure 2. Geographic distribution of species in Machaerium section Machaerium.

1. MACHAERIUM QUINATA (Aublet) Sandwith, Kew Bull. 1931: 359. 1931.

Trees, shrubs, or lianas, to about 16 m tall, usually unarmed; young stems ferrugineo-tomentulose, glabrescent; stipules deltoic-lanceolate, acuminate, striate, moderately pubescent, about 10-15 mm long, 4-10 mm wide at the base, caducous or sometimes indurated. Leaves 5-15-foliolate, axis ferrugineo-tomentulose, about 6-18 cm long, leaflets coriaceous, about 4-15 cm long, 1.5-7.5 cm wide, oblong, ovate, or obovate, acute, breviacuminate, or obtuse, apiculate at the apex, obtuse to cuneate at the base, puberulent to glabrous above, crisp-pubescent beneath, secondary veins conspicuous, about 12-20 on a side, essentially parallel, extending to the margin, tertiary veins percurrent, scalariform. Inflorescences racemose or paniculate, axillary or terminal with axes ferrugineo-tomentulose; bracts striate, tomentulose, glabrescent, linear to ovate, acuminate, 10-30 mm long, 2-7 mm wide, caducous; bracteoles tomentulose, broadly ovate, obtuse, 1-4 mm long, 1.5-4 mm wide, caducous. Flowers 8-17 mm long on pedicels 1-3 mm long; calyx ferrugineo-tomentulose or velutinous, 2.5-6 mm long, 2-4 mm in diameter; petals purple to pink or white, vexillum pubescent on the outer face; stamens 10, monadelphous. Fruit winged, straight or slightly bent, ferrugineo-tomentulose, 7-11 cm long including stipe about 1 cm long, seminiferous body 1.5-3.5 cm long, 1-1.5 cm wide, wing about 4-7 cm long, 1.5-3 cm wide.

1a. MACHAERIUM QUINATA var. QUINATA

Machaerium quinata (Aublet) Sandwith, Kew Bull. 1931: 359. 1931.

Nissolia quinata Aublet, Fl. Guian. 2: 743; 4: tab. 297. 1775.

Type: J. E. C. F. Aublet s. n., French Guiana (holotype W;

isotypes Ek, F fragm. ex W, F neg. 32075 ex W, P-Juss, W).

Quinata violacea Medikus, Vorles. Churpf. Phys.-Oken. Gen. 2: 389.

1787, based on Nissolia quinata Aublet, non Machaerium violaceum Vogel 1837.

Nissolia ferrugineum Willdenow, Sp. Pl. 3: 900. 1802, based on

Nissolia quinata Aublet.

Machaerium ferrugineum (Willdenow) Persoon, Syn. Fl. 2: 276. 1807.

Nissolia diacelpha de Canolle, Prod. 2: 258. 1825.

Type: G. S. Ferrottet 24, French Guiana, Cayenne (holotype G-DC; F neg. 6942 ex G; isotype FI).

Machaerium diacelphum (DC) Vogel, Linnaea 11: 182. 1837.

Machaerium lignosum Bentham, in Martius, Fl. Bras. 15(1): 253,

1862, nomen in synonym.

The typical variety is represented by specimens with relatively large flowers, 12-17 mm long, commonly about 13-15 mm long; calyx tomentulose, 5-6 mm long, 3-4 mm in diameter; bracteoles 2-3 mm long, 3-4 mm wide.

Distribution: On "terra firme", igapo, riparian forest, and savanna, usually in sandy soil, at elevations up to about 300 m, southern Venezuela, Guyana, Surinam, French Guiana, and northern Brazil. Introduced in Martinique.

Pl 297

*Nissolia Quinata*

L. Henriquez Sculp

Figure 3. *Nissolia quinata* Aubl., basionym of *Machaerium quinata* (Aubl.) Sandw. Copy of plate 297, Aubl., Fl. Guian. 4. 1775.

Local names: Acayere (Venezuela); kraboejassi tetei (Surinam); kunikully (Guyana); quinata (French Guiana); timbo brabo (Brazil); waliballi or wariballi (Surinam).

Martinique: St. Pierre, Jardin botanique, Duss 350 (NY).  
Mornes au Nord du St. Pierre, Belanger 686 (FI, G, P). "Antilles",  
de Tussac s. n. (FI, G).

Venezuela: Amazonas: "Prope San Carlos, ad Rio Negro, Brasilia"  
Spruce 3688 (BM, Bk, F, FI, G, GH, GOET, K, NY, P, W). Rio Negro,  
Riedel 41 (K), s. n. (K). Bolívar: On island 1 mi above Raudal Agua-  
canta, Río Paragua, Cerro Guaiquinima, Maguire 32706 (NY, US, VEN).  
Santa Elena, margin of Rio Kukenán, Tamayo 2713 (UC, US, VEN).  
Selva del Río Cuyani, Cardona 2801 (VEN). About 40 km S of El Dor-  
ado, along road in primary forest, Meijeraan 36 (WAG).

Guyana: without exact locality, A. Anderson s. n. (BK); Appun 349 (K), 628 (K); hich. Schomburgk 1079 (BM, P), s. n. (W); Robt. Schomburgk 579 (BK, F, FI, G, K, L, P, W), 816 (BM, G, GH, K, NY, F, W). Talbot s. n. (K). Essequibo, G. F. W. Meyer 253 (GOET); Jenman 1158 (K). Mazaruni Sta., For. Dept. B. G. 4157, Fanshawe 1421 (K, NY). Kurupung, Jacóba, Lang & Persaud 251 (F, US), 265 (F, NY). Mazaruni k., Jenman 692 (K). Tapacooma Cr., Jenman 6556 (K, NY). Upper Kupununi k., near Dadanawa, de la Cruz 1460 (GH, NY, US), 1726 (F, GH, MO, NY, US). Upper Mazaruni k., de la Cruz 2369 (F, GH, MO, NY, US), 2389 (F, GH, MO, NY, UC, US). Demerara k., de la Cruz 2461 (F, GH, MO, NY, US), 2640 (F, GH, MO, NY, UC, US). Pomeroun k., de la Cruz 3084 (F, GH, MO, NY, UC, US). Kamukusa, de la Cruz 2818 (NY), 2838 (F, GH, MO, NY, UC, US). Takutu Cr. to Furuni k., Mazaruni k., For. Dept. B. G. 4845, Fanshawe 2109 (COL, NY, P, S, U, US, W). Basin of Essequibo R. near mouth of Onoro Cr., A. C. Smith 2682 (A, F, G, K, MO, NY, P, S, U, US). Isherton, A. C. Smith 2476 (A, F, G, K, MAD, MO, NY, P, S, U, US). Savanna between Takutu R. and Kanuku Mts., A. C. Smith 3274 (A, F, G, IAN, K, MAD, MO, NY, P, S, U, US, W). Koriabo k., Archer 2589 (US). Arawan k., Archer 2342 (K, US). Along Potaro k. above Kaietur, Maguire & Fanshawe 23370 (A, Bk, F, G, K, MO, NY, F, Kb, U, US, VEN). Bartica, Sandwith 481 (K, NY, U); Jenman 4682 (K); For. Serv. B. G. 3062, Fanshawe 326 (F, K, S); For. Dept. B. G. 7036, Fanshawe 3458 (K).

Surinam: without exact locality, Pulle 527 (U); Hostmann 1304 (BM, F, FI, G, GH, K, MO, NY, P, U, US), 1304a (S). Berlijn, Focke 322 (L), 944 (U); Wullschlagel s. n. (BK). Cottica R., Focke 105 (L), 678 (U). Paloemeu, Versteeg 889 (U); Schmidt s. n. (U). Near Republiek, Kuyper 59 (U). Patamacca, Borsboom 12263 (WAG). Wane Cr., Lanjouw & Lindeman 621 (U). Tanjimana k., Mennege 454 (U). Piaikreek, Pulle 573 (U). Nassau Mts., Lindeman & Cowan 7031 (U). Para k., Boldingh 3839 (U). Surinamskreek, Splitgerber 517 (L). Suriname k. near kabelstation, Lanjouw 1207 (U). Wilhelmina Gebergte, Zuid k., Kayser Airstrip, Irwin et al. 57507 (F, G, GH, MO, NY, F, U, US). Scotelweg, Archer 2855 (US). Simon Cr. above Carolina, Archer 2900 (US). Joden savanna, Suriname k., Kegel 1189 (GOET, NY); Lindeman 5229 (U); Donselaar 268 (U); Schulz 8638 (U); Wullschlagel 118 (BK). Litanie k., nombouts 843 (BK, U, US); Versteeg 424 (U). Watramiri, For. Bur. Sur., Boschwegen, Herb. no. 3323 (IAN, K, MO, NY, U). Tibiti savanna, Tibiti R., Lanjouw & Lindeman 1866 (K, NY).



French Guiana: Without exact locality, Melinon 366 (P);

Gabriel s. n. in 1802 (G); Leblond 76 (G); Leprieur s. n. (G); Perrottet 26(G,K), 27 (G), 30 (G), s. n. (G,k,P). Cayenne, Martin s. n. (P). Maroni R., Melinon 37 (BK, F, G, L, P), 101 (K), 325 (P), 349 (A, BM, F, GH, A, NY, P, US), s. n. (K); Benoist 71 (P), Genoeger 56 (P). Acarouany, Melinon 221 (P). "Fleuve Kourou, au village Saramacca", Oldeman B-1293 (KY, P, US). Yaroupi, 0.5 km from confluence with Rio Oiapoque, Irwin et al. 48479 (IAN, MG, MICH, MO, NY, S, SP, US, VEN). Rio Camopi, Oldeman 2537 (IAN, K, NY, P, U,US). "Pouveau Chautier", Benoist 352 (P). Gourdouville, Benoist 1679 (P). Charvein, Benoist 147 (P). Mana, Melinon 158 (P).

Brazil: Amapá: Cachoeira Utussansain, Irwin et al. 47990 (GH, IAN, MG, NY, US). Rio Oiapoque, Fróes 26644 (IAN, P, RB, US). Beira do Oiapoque, Black 49-8292 (IAN, U). Maranhão: Alto de Alegria, Snethlage 335 (F). Pará: Belém, Black & Ledoux 50-10089 (IAN); Pires & Black 394 (IAN). Ilha do Mosqueiro, Killip & Smith 30427 (NY, US). S. Miquel do Guamá, Dardano & Black 48-3157 (IAN). Cachoeira do Mangobal, Rio Tapajós, Ducke /MG no/ 16440 (BK, MG, US). Mosqueiro, Rio Pará, Ducke /KB no/ 17166 (S, US). Rio Canaticó, Ilha do Marajó, Pires 1220 (IAN, US, VEN). Belém, IAN, Archer 7648 (IAN, NY, US), 7894 (IAN, US), 8057 (P, IAN, K, NY, US); Pires 51934 (NY, K, S, US). Vigia, Ilha de Colares, Fróes 30664 (IAN). Bragança, Oliveira 6268 (MG); Huber /MG no/ 1678 (MG), 1743 (MG). Amazonas: Tapurucuara (Santa Isabel), Rio Negro between mouth of Rio Curicuriari and Barcellos, Schultes & López 8912 (F, GH, IAN, K, NY). Rio Negro, Santa Isabel, Comissão Rondon/ 22175 (M). Baía de buiaçu, lower Rio Negro, France et al 11482 (K, MG, NY, US). Rio Negro between Ilha Jacaré and Airão, France et al 15085 (K, MG, NY, US). Rio Urubú, Sapato, Fróes 25347 (IAN, SP).

The correct epithet for this species is quinata rather than quinatum as sometimes written. Sandwith, the author of the combination, treated it as a substantive, following Aublet's citation, "Nomen Caribaeum QUINATA".

1b. MACHAERIUM QUINATA var. PARVIFLORUM (Bentham) Kudd, Phytologia 24: 121. 1972.

Machaerium nervosum Vogel, Linnaea 11: 186. 1837. Type: A. Poiteau s. n., French Guiana (holotype B, destroyed).

Machaerium ferrugineum (Willd.) Persoon  $\beta$  parviflorum Bentham in Martius, Fl. Bras. 15(1): 253. 1862, based on M. nervosum Vogel.

This variety is characterized by leaflets and flowers smaller than those of the typical variety, 8-12 mm long, commonly 10 mm long or less; calyx about 2.5-3 mm long, 2-3 mm in diameter; bracteoles 1-2 mm long, 1.5-2.5 mm wide; pubescence in general usually with shorter, more tightly crispate hairs.

Distribution: On "terra firme", sandy soil, in forest or savanna at elevations up to about 1290 m. Colombia, Venezuela, French Guiana, and Brazil.

Colombia: Vaupes: Guaracapuri Cachoeira, Río Vaupes, region E of Mitu, Allen 3378 (GH, NY, US). Soratama, Río Apaporis, Schultes & Cabrera 15155 (GH, NY, U, US); García-Barriga 14118 (COL, NY). Venezuela: Amazonas: Yavita, Ll. Williams 13950 (F, G, MO, NY, US). Bolívar: Koraima, Kobt. Schomburgk 697 (BM, GH, K, P, W). Mt. Koraima district, Analiupu, along Río Arabupu, Pinkus 52 (F, G, GH, NY). SE of Santa Elena, Bernardi 6744 (NY, US). Along Río Karuai, at base of Sororopán-tepui, W of La Laja, Steyermark 60776 (F, MO, VEN). Lower part of Quebrada O-paru-má, tributary of Río Pacairao, below Santa Teresita de Kavanayán, Steyermark 60577 (F, MO). French Guiana: Saül, Mori & Boom 15353 (NY, SFV). Brazil: Amapá: Rio Oiapoque, near Mt. Carupina, Pires & Westra 48811 (G, GH, IAN, K, MG, NY, U, US, VEN). Maranhão: Assu region, Fróes 40 (US). Capoeira Assu, Cachoeira, Maracassumé R., Fróes for Krukoff 2012 (A, BM, F, G, K, MICH, MO, NY, P, S, U, US). Ilha Maranhão, capoeira, Ducke /MG no./ 361 (MG). Amazonas: Manáos, Ducke /RB no./ 24192 (S, U, US). Estrada do Aleixo, Ducke 2027 (A, COL, IAN, MG, K, U, US, VEN), Igapé de Flores, Centro Pesquisas Florestais 6095 (US). Manáos, Killip & Smith 30190 (NY, US). "Prope Panuré ad Rio Vaupes", Spruce 2900 (BM, W). Rodovia Itacoatiara - Manaus, km 19, Oliveira 3032 (IAN). Manaus, Colônia Santo Antônio, Rodrigues et al. 8696 (MG). Pará: Bragança, Campo de Cima, N. T. Silva 524 (IAN). Belém, IPEAN, Pires & Silva 10976 (IAN). Mato Grosso: Muns. Sinop & Colider, along BR 080, ca 95 km E of BR 163, Thomas et al. 4185 (NY, SFV).

There is intergradation and it is often very difficult to distinguish these two varieties. Treating them as separate might not be justified and further study is desirable. The differences are slight and could be due to edaphic conditions rather than genetic. Some collections with smaller flowers actually are immature specimens.

Local names: Acoi-yeré-yek (Venezuela); chaparillo (Venezuela); japundá (Brazil); maripa-yen-ya-pupen-yek (Venezuela); uña de murcielago (Venezuela); unha de gato (Brazil).

## 2. MACHAERIUM DUCKEANUM Hoehne, Fl. Brasílica 25(3): 49. 1941.

Machaerium macrocarpum Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 152. 1922, non Bentham 1840. Lectotype (here designated): A. Ducke /MG no./ 16928, Brazil, Pará, Obidos, "varzea de l'Amazona", 22 Jan. 1918 (hololectotype MG; isolectotypes BM, F fragm. ex MG, G, KB, US).

Lianas or scandent shrubs; young stems ferrugineo-tomentulose, glabrescent; stipules lanceolate, striate, pubescent, usually glabrescent, 5-15 mm long, 3-5 mm wide at the base, caducous or spinescent. Leaves 9-15-foliolate, axis tomentulose, (6-) 8-27 cm long. Leaflets coriaceous, oblong, elliptic to obovate, 4-25 cm long, 2.5-11 cm wide, acute, breviacuminate, or obtuse at the apex, rounded to subcordate at the base or the terminal leaflet sometimes cuneate at the base, upper surface puberulent but glabrate at maturity, moderately pubescent with lax to crispate hairs beneath, secondary veins prominent, about 14 on each side, essentially parallel,

extending to or almost to the margin, tertiary veins scalariform-reticulate. Inflorescences terminal or axillary, racemose or paniculate, axes ferrugineo- or fulvo-tomentulose; bracts deltoid-ovate, striate, tomentulose, 4-5 mm long, 3 mm wide; bracteoles broadly ovate or semiorbicular, obtuse, 2 mm long and wide. Flowers about 9-12 mm long on pedicels (1-) 2-3 mm long; calyx ferrugineo-tomentulose, about 5-6 mm long, 4-4.5 mm in diameter; petals rose-violet, vexillum sericeous on the outer face; stamens monadelphous. Fruit wingless, lunate-reniform, fusco- or ferrugineo-tomentose, somewhat glabrescent with age, 5-6 cm long, 2-3.5 wide, stipe to about 4-5 mm long.

Distribution: Known from Colombia, Peru, and Brazil on varzea lands along the Amazon river and tributaries to about 200 m elev.

Colombia: Nariño: Rio Sequión, Mun. Iscuande, Romero-Castañeda 5474 (COL). Peru: Loreto: Nanay, south bank of river, Ll. Williams 561 (F). Río Huallago near Lagunas, Croat 17833 (MO, US). Distr. Pebas, ca 150 km ENE of Iquitos, Brillo Nuevo, Yaguasycu R., Tracy & Alcorn 140 (F, US). Brazil: Amapá: Mun. Mazagão, BR 156, 70 km WSW of Macapá toward Monte Lourado, Rio Preto, Daly et al. 3961 (SFV). Amazonas: Tonantins, inundate margin of Paraná de Tonantins, Ducke 1576 (A, F, LAN, MG, NY, K, SI, UC, US). Pará: Paraná de baixo de Obidos, Ducke /MG no./ 15920 (BM, F fragm ex MG, G, MG, RB, US). Mato Grosso: Santa Anna do Chapada, Malme /Regnell II no./ 2458 (F, S), 2458a (S). Near Presidente Marques station on Madeiro-Mamoré RR., J. G. Kuhlmann /RB no./ 18199 (S, U).

Machaerium duckeanum and M. quinata can readily be distinguished by their fruit but in flower, or sterile, they are scarcely separable. Thus far there is no evidence of fruit intermediate between winged and non-winged as is the case in the complex species M. macrophyllum, for example. Should such intermediates be found it might be reasonable to consider reducing M. duckeanum to a variety of M. quinata.

3. MACHAERIUM LINDENIANUM Bentham, Jour. Linn. Soc. 4, suppl.: 67. 1860. Type: J. Linden 1647, Colombia, Guajira, "San Antonio, Prov. Rio Hacha, "7000 Pds. Nevada", Jan. 1844 (holotype K as "Caracas"; isotypes BM, G, K, P, W, F neg. 32097 ex W).

Machaerium ferrugineum ? lindenianum (Benth.) Benth. in Mart. Fl. Bras. 15 (1): 253. 1862.

Delbergia lindenianum (benth.) Hoehne, Fl. Brasilia 25(3). no. 128: 8. "Fevereiro" 1941; no. 126: 19. "Julho" 1941.

Lianas; young stems ferrugineo-tomentulose, glabrescent; stipules caducous or spinescent, indurated, about 3 mm long. Leaves 5-11-foliolate, axis about 10-26 cm long, tomentulose. Leaflets coriaceous, elliptic to obovate, 3.5-10 cm long, 2-6 cm wide, obtuse to subacute at the apex, rounded to acute at the base, upper surface glabrous at maturity, lower surface moderately pubescent with laxly crispate hairs, secondary veins conspicuous, 6-12 on a side, essentially parallel, extending to the margin, tertiary veins predominantly obliquely percurrent. Inflorescences terminal, paniculate, axes ferrugineo-tomentulose; bracts lanceolate, 1-5 mm long;

bracteoles lanceolate to oblong, 1.5-2 mm long, 1 mm wide. Flowers 7-10 mm long on pedicels about 5 mm long; calyx tomentulose, 3-3.5 mm long, 2.5 mm in diameter; petals white, vexillum glabrous or slightly pubescent on the outer face; stamens monadelphous. Fruit winged, ferrugineo-pilose, glabrescent, especially on the wings, 6-7 cm long including stipe 3-5 mm long, seminiferous body 1.5-2 cm long, 1-1.3 cm wide, wing 3.5-5 cm long, 2-2.2 cm wide.

Distribution: Known from northern Colombia and northwestern Venezuela.

Colombia: Magdalena: San Sebastián de Rábago, Romero-Castañeda 868 (COL, US). Tayronaca, Romero-Castañeda 904 (COL, MO). Venezuela: Zulia: Dept. Colón, vicinity of Casigua El Cuba, Bunting & Fucci 8451 (US).

Hoehne transferred this species to *Dalbergia* and considered it a synonym of *D. hypargyrea* Harms, a taxon that I believe to be better placed as a variety of *Machaerium floribundum*.

4. MACHAERIUM NIGRUM Vogel, *Linnaea* 11: 188. March 1837.

Type: C. Gaudichaud s. n., Brazil, near Rio de Janeiro (holotype B "Herb. Kunth", presumably destroyed; isotypes G. F).

? Nissolia fruticosa Vellozo, *Fl. Flum.* text 298. 1825; *Icones* tab. 86. 1831 fide Bentham, non Jacquin 1780. Type not known, represented by illustration cited, Brazil, vicinity of Rio de Janeiro, "Frequentissime habitat fruticetis maritimis."

Machaerium velutinum Bentham, *Comm. Legl. Gen.* 36. June 1837; *Ann. Wiener Mus.* 2: 100. 1839. Type: J. C. Mikan s. n., Brazil, Rio de Janeiro, "Fertininga", in 1817-1818 (Lectotype W; islectotypes F fragment, K).

Trees or sometimes scandent; young stems fusco- or sordido-tomentulose; stipules caducous, not spinescent, not seen. Leaves 7-17-foliolate, axis sordido-tomentulose, about 6-16 cm long. Leaflets subcoriaceous, oblong to elliptic, 3-12 cm long, 1-4.5 cm wide, acute or acuminate, base rounded to acute, upper surface puberulent, glabrate at maturity, usually darkening on drying, densely to moderately crisp-pubescent beneath, secondary veins conspicuous, about 7-12 on a side, approximately parallel, tertiary veins reticulate or subpercurrent. Inflorescences axillary or terminal, pauculate with axes tomentose; bracts sericeous, deltoid to broadly ovate, 1-5 mm long, 1-2 mm wide at the base; bracteoles ovate, about 1.5-2 mm long and wide. Flowers 7-10 mm long, sessile; calyx sordido- or fulvo-sericeous, somewhat glabrescent, strongly striate, 3.5-4.5 mm long, 2 mm in diameter; petals drying to dark violet (fide Vogel), vexillum sericeous on the outer face; stamens monadelphous. Fruit winged, essentially straight, sordid-velutinous, about 6-8 mm long including stipe 5-10 mm long, seminiferous body 1-2 cm long, 1 cm wide, wing 4-5.5 cm long, 1.2-1.8 cm wide.

Distribution: Known only from the general area of Rio de Janeiro, Brazil.

Local name: Jacarandá preto.

Brazil: Without exact locality, Capanema s. n. (RB). Itaipu /"Taipu"/. Riedel s. n. in 1833 (BM, P, US, W). Pertinanga, Riedel 1296 (P); Casaretto 1800 (G). Itaguahy /"Itaguahy"/, Bowie & Cunningham 4 (Bh.). "Itaguai", Pessoal do Horto Florestal /RB no./ 55666 (MO, NY, RB). "Villa de Itaguahy", Pessoal do Horto Florestal 1630 (RB, SP). Rio de Janeiro /"Sebastianopolis"/, Schüch s. n. (Bk, M). "Atalaia", Glaziou 2534 (A, Bk, Bk, Fl, G, K, MG, NY, P, SP fragm. ex MG, UC, US). Realengo, Glaziou et al. 10564 (G, K, P). São Cristavão, Pohl s. n. (W); Schwacke 2020 (RB). Paraiba do Sul, J. G. Kuhlmann s. n. /RB no./ 55664 (SP). M. Kuhlmann s. n. /SP no./ 37010 (SP).

This species is somewhat anomalous in section Machaerium, geographically and morphologically except for the pattern of leaf-let venation, but it is convenient to follow Bentham's placement.

Bentham, himself, in 1860 reduced his M. velutinum to the prior M. nigrum. At that time and also in 1862 he cited, with a question, Nissolia fruticosa sensu Vellozo /non Jacquin/ in synonymy under M. nigrum. In the absence of voucher specimens for Vellozo's determinations the question remains moot.

5. MACHAERIUM PIRESII Kudd, *Phytologia* 24: 121. 1972.

Type: J. Murça Pires 577, Brazil, Amazonas, Rio Negro, Serra de São Gabriel, virgin forest, 1 May 1947 (holotype IAN; isotypes NY, US).

lianas; young stems ferrugineo-tomentulose, glabrescent. Stipules deltoid, spinescent, to about 8 mm long, 3 mm wide at the base. Leaves 7-13-foliolate, axes 15-35 cm long. Leaflets coriaceous, ovate to elliptic-oblong, or oblong-obovate, 6-17 cm long, 3-7 cm wide, acute to acuminate, rounded at the base, upper surface pubescent along the midvein, otherwise glabrous, lower surface tomentulose, secondary veins prominent, about 6-15 pairs, approximately parallel, extending to the margin, tertiary veins reticulate, inconspicuous. Inflorescences terminal, paniculate, axes tomentulose; bracts deltoid, striate, pubescent, spinescent, 7-8 mm long, 3-5 mm wide at the base; bracteoles broadly ovate, 1.5-2 mm long and wide. Flowers 5-6 mm long, essentially sessile; calyx tomentulose, 2-2.5 mm long, 1.5 mm in diameter; petals reddish, vexillum pubescent on the outer face; stamens monadelphous. Fruit winged, drying to dark brown, ferrugineo-tomentulose, glabrescent, somewhat sigmoid, 8-10 cm long including stipe about 5 mm long, seminiferous body 2.5-3 cm long, 1.2-1.5 cm wide, wing 5-7 cm long, 2-2.5 cm wide.

Distribution: Known only from forest of the Rio Negro area of Brazil.

Brazil: Amazonas: Curucuhy, Rio Negro, high forest, Fróes 22159 (IAN, U, US).

6. MACHAERIUM MACROPHYLLUM Bentham, *Comm. Leg. Gen.* 35. 1837.

Trees or lianas, to about 18 m tall; young stems puberulent, armen or unarmed; stipules caducous or indurated, spinescent, deltoid, acute, ascending or spreading, 3-7 mm long, 2-3 mm wide at the base. Leaves 5-9-foliolate, axes 8-20 cm long, puberulent, glabrescent. Leaflets coriaceous or subcoriaceous, obovate to elliptic, 8-24 cm long, 3-11 cm wide, usually obtuse, base rounded to acute, upper surface glabrous or puberulent along the midvein, lower surface moderately to densely pubescent with minute, appressed hairs, sometimes glabrescent, secondary veins conspicuous or inconspicuous, about 15-25 on each side, approximately parallel, mostly extending to the margin, tertiary veins relatively inconspicuous, predominantly reticulate, sometimes percurrent. Inflorescences paniculate or racemose, terminal or axillary, axes ferrugineo-tomentulose or velutinous; bracts ferrugineo-sericeous, deltoid, 3-5 mm long, sometimes spinescent; bracteoles ovate to elliptic, obtuse, 1-1.5 mm long, 1.5 mm wide, rarely linear or filiform. Flowers 5-12 mm long, essentially sessile; calyx ferrugineo-sericeous to tomentulose, 2-4.5 mm long, 1.5-3 mm in diameter, lobes 1 mm long or less; petals white to purplish, vexillum pubescent on the outer face; stamens monadelphous or sometimes splitting 5:5 at maturity. Fruit winged to reniform, fulvo- to ferrugineo-velutinous, 5-8.5 (-10) cm long including stipe 2-3 mm long, seminiferous body 1.5-4 cm long, 1-2.5 (-3) cm wide, wing 2.5-6 cm long, 1.5-4 cm wide.

6a. MACHAERIUM MACROPHYLLUM VAR. MACROPHYLLUM

Machaerium macrophyllum Bentham, *Comm. Leg. Gen.* 35. 1837; *Ann.*

*Wiener Mus.* 2: 99. 1839; *Jour. Linn. Soc. Bot.* 4, suppl.: 67.

1860; /as Mart./ in Martius, *Fl. Bras.* 15 (1): 253, pl. 80, fig. 2. 1862. Type: C. F. P. Martius /Obs./ 3099, Brazil, "in sylvia ad fluven Solimaen provinciae Rio Negro" (holotype M).

Machaerium iquitosense Macbride, *Field Mus. Bot. Publ.* 23 (1): 280.

1943. Type: G. Klug 479, Peru, Loreto, Mishuyacu, near Iquitos, alt. 100 m, forest, Oct.-Nov. 1927 (holotype US, F neg. 46013 ex US; isotypes, F, NY).

Flowers about 5-8 mm long; calyx 2.5-3 mm long, 1.5-2 mm in diameter; fruit alate, straight or somewhat bent, fulvo- tomentulose or somewhat glabrescent with age, 6.5-8.5 cm long including stipe 2-3 mm long, seminiferous body 1.5-2.5 cm long, about 1 cm wide, wing 5-6 cm long, 1.5-2 cm wide.

Distribution: In forest of Amazonian Colombia, Peru, Brazil, in southern Venezuela, Guyana, and Surinam, to about 800 m elevation.

Colombia: Amazonas: Leticia, Black & Schultes 46-201 (IAN, NY, U, US, VEN); Ducke 1821 (A, F, IAN, K, MG, NY, R, US); Schultes et al 24093 (ECON, US), Schultes & Lopez 10401 f (COL, GH, US).

Venezuela: Without exact locality, Lizot 137 (VEN). Bolívar: Mouth of Río Nichare and Cicuta (Icuta), tributary of Río Caura, Steyermark & Gibson 95644 (NY, US). Amazonas: Yavita, Ll. Williams 14164 (F, G, MO, NY, VEN). Sierra Parima, vicinity of Simarawochi, Río Matusé, Steyermark 107029 (US), 107161 (US).

Depto. Atabapo, S.E. bank of the middle part of Caño Yagua at Curcurital de Yagua, Davidse et al. 17449 (US). Vicinity of Culebra, Río Cunucunuma, Stevevmark & Delascio 129341 (US). Depto. Río Negro, 15 km NE of San Carlos de Río Negro, Liesner 7472 (US). 1-3 km E of Cerro de Neblina base camp on Río Mawarinuma, Liesner 15763 (NY).

Guyana: Norther slope of Akari Mts. in drainage of Shodikan Cr., Essequibo R. tributary, A. C. Smith 2919 (A, F, G, K, MO, NY, P, S, U, US).

Surinam: Near Brokopondo, Donselaar 2378 (U). Between Afobaka and Brownsweg, Donselaar 2984 (U, US). Creek forest 8 km ESE of Brownsweg, Donselaar 2451 (U). Brokopondo, E of village, Donselaar 3066 (U), 3076 (U, US); N of village, Donselaar 3110 (U, US), 3123 (U, US). Jodensavanne - Mapane Creek area (Suriname K.) along small creek W of Camp 12, block 636, Lindeman 5231 (U).

Peru: Loreto: Maynas, ca 2-4 km from Quisto Cocha near Nauta road, McDaniel & Kimachi 18339 (MISSA, SFV).

Brazil: Amazonas: Rio Negro, "sylvia Japurehyba ad Cupati", Martius 3099 (M). "Rio Negro in sylvia ad fluviu Tapura", Martius s. n. (M). Vaupes, Pires 530 (COL, IAN, NY). Içana, Fróes 22263 (COL, IAN, U).

Publications in 1837, 1839, and 1860 indicated that Bentham was the author of this species. In 1862, in Flora Brasiliensis, Martius was so cited, possibly as a matter of courtesy, or to correct an oversight in the earlier publications. However, on the basis of the original description, the correct attribution apparently should be to Bentham.

Collections without fruit are questionably identified as to variety although the flower size can also be a useful character.

6b. MACHAERIUM MACROPHYLLUM var. BREVIALATUM Rudd, Phytologia 24: 122. 1972. Type: R. Fróes 20410, Brazil, Pará, Rio Guamá, 16 Jan 1945 (holotype US; isotypes IAN, NY).

Drepanocarpus macrophyllum (Bentham, as "Mart.") Ducke, Arch. Jard. Bot. Rio de Janeiro 1: 34. 1915, sensu Ducke non basionym (apparently, erroneously based on typical Machaerium macrophyllum).

Flowers 8-12 mm long, calyx 3-5 mm long, 2.5-3 mm in diameter; fruit reniform or with a short, wide wing, ferrugineo-velutinous, somewhat glabrescent, 5-7 (-10) cm long including stipe about 2 mm long, seminiferous body 3-4 cm long, 2-2.5 (-3) cm wide, wing 2.5-3 (-6) cm long, 3-4 cm wide.

Distribution: In wet forest along river banks at or near sea level in Amazonian Brazil.

Brazil: Amapá: Rio Matapi, Macapá, Rabelo et al 1842 (SFV ex NY). Porto Grande, região da Vila Nova, Rosa 1053 (SFV ex NY). Pará: Belém. Ducke /R no./ 5394 (R), Ducke /MG no./ 15505, /RB no./ 11735 (RB), Ducke /MG no./ 15552 (MG); Pires & Black 674 (GH, IAN), 684 (GH, IAN, RB); Pires & Silva 10847 (IAN, NY); Guedes 250 (IAN), /MG no./ 1293 (G, MG, BM); Silva 347 (IAN, K, US). Belém, Bussuquara, Igapo, Pires & Black 407 (IAN), Belém, Igapó do Mocambo, Pires 10180 (IAN). Belém, João Coellio, Rio Carapari, Pereira 3348. Egler 619 (RB). Caripí, Spruce 224 (K). Caraparu, Egler 619 (MG).

Igarapé Una, Huber /MG no./ 2084 (BM, G). Ilha do Mosquero, Killip & Smith 30556 (NY, SP, US), 30644 (NY, US). Estrada Belém-Mosquero, Baía do Sol, Pires & Silva 11267 (IAN). Beira do Guamá, Black & Foster 48-3398 (IAN, US); Oliveira 3127 (IAN). Margem do Rio Guaná, Pires 2675 (IAN). Furo da Jacaraca, Guedes /MG no./ 2203 (BM, RB). Região do Anapú, Rio Maparauá, Portel, Fróes 32952 (IAN, NY). Cunaní, Huber /MG no./ 1165 (BM, MG, RB). Marajó, Rio Anabiju, Mun. de Muaná, Oliviera 3223 (IAN), 5128 (IAN). Rondônia (as Mato Grosso): Near Tabajara, upper Machado R. region, Krukoff 1424 (A, BM, G, K, MICH, MO, NY, P, S, U, UC).

Ducke interpreted collections with reniform fruit as identifiable with typical *M. macrophyllum* which, in 1915, he transferred to *Drepanocarpus*. It was an understandable conclusion; the type material and the illustration in Flora Brasiliensis show only leaves and flowers. As mentioned earlier, without fruit, determinations to variety may be questionable.

My interpretation relating alate fruit to the typical variety is largely based on geography. Collections such as Pires 530 from up-river, near the type locality, bear alate fruit. The material that Ducke studied, from the lower Amazon region, has reniform fruit, and has thus been designated as varietally distinct.

There is intergradation in shape and size of fruit. Sometimes, even with fruit proper placement as to variety can be problematic. For example, Oliveira 5128 has long but wide wings unlike the typical material of either variety. I have cited it as var. brevialatum but further study is warranted.

Another anomalous collection is Killip & Smith 30556. Unlike in all the other collections observed, the bracteoles are linear-filiform rather than ovate to elliptic. Otherwise, the material, in fruit, appears to be referable to var. brevialatum.

7. MACHAERIUM FLORIBUNDUM Bentham, Jour. Linn. Soc. 4, suppl.: 68. 1860.

Trees, shrubs, or lianas, to about 25 m high, or more; stipules spinescent, recurved, to about 8 mm long, 4 mm wide at the base. Leaves 5-11-foliolate, axes sericeous to glabrous, 8-15 cm long. Leaflets coriaceous, predominantly elliptic, sometimes ovate or obovate, (3-) 4-26 cm long, (1.8-) 2-11 cm wide, breviacuminate or obtuse at the apex, rounded at the base, glabrous above, sericeous to subglabrous beneath, secondary veins conspicuous, about 9-15 on each side, mostly about 5-15 mm apart, approximately parallel, usually extending to the margin, tertiary veins reticulate to weakly percurrent. Inflorescences terminal, paniculate, axes ferrugineo-sericeous or subsericeous; lower bracts spinous and persistent like the stipules, about 2 mm long, upper bracts deltoid-ovate, caducous, 2-5 mm long; bracteoles pubescent, ovate, 1-2 mm long, 1-1.5 mm wide. Flowers 4-10 mm long on pedicels 1 mm long or less; calyx ferrugineo-sericeous, 2-4 mm long, 1-2.5 mm in diameter;



petals pale lilac or white, vexillum usually with reddish or purplish markings, glabrous or pubescent on the outer face; stamens monadelphous, sometimes with a tendency toward separation of the vexillar filament. Fruit alate, straight or slightly curved, or, falcate-subreniform with a relatively shorter wing, ferrugineo-puberulent to glabrous, 7-9.5 cm long including stipe 3-5 (-10) mm long, seminiferous body about 2-2.5 cm long, 0.8-1.7 cm wide, wing (2-0 5-6.5 cm long, 1.3-2 cm wide.

7a. MACHAERIUM FLORIBUNDUM var. FLORIBUNDUM

Machaerium floribundum Bentham, Jour. Linn. Soc. Bot. 4, suppl.: 68. 1860; in Martius, Fl. Bras. 15(1): 254. 1862. Lectotype:

R. Spruce 290, Brazil, Pará, "ad ripas fl. Amazonum, infra Santarem, Canal de Tagipuru, Oct. 1849" (hololectotype K; isolectotype W).

Machaerium fagifolium Klotzsch, Schomb. Reisen in Brit. Guiana 1205.

1848, nom. nud. Type: Richard Schomburgk 97, F neg. 2282 ex B; F fragment.

Drepanocarpus venezuelensis Pittier, Contr. U. S. Nat. Herb. 20:

122, fig. 59. 1918. Type: H. Pittier 6108, Venezuela, Miranda, El Cedral de las Adjuntas, near Los Teques, alt. 1000-1800 m, 26-28 April 1913 (holotype US; isotypes NY, P, US).

Machaerium decorticans Ducke, Arch. Jard. Bot. Rio de Janeiro 3:

150. 1922. Lectotype: A. Ducke /RB no./ 11650, Brazil, Pará, "prope fluvium Tapajos medium ad locum Francez, silva primaria", 20 Dec. 1919 (hololectotype RB; isolectotypes K, P, S, U, US).

Machaerium woodworthii Standley, Contr. Arn. Arb. no. 5: 81. 1933.

Type: R. H. Woodward & F. A. Vestal 422, Panama Canal Zone, Barro Colorado Island, shore W of Point Salud, 5 Feb. 1932 (holotype F; isotypes A, G).

Machaerium rosescens Standley, Publ. Carnegie Inst. Wash. no. 461:

24. 1935. Type: W. A. Schipp 1091, Belize (British Honduras), Toledo, Big Rock, "in forest shade, 300 ft. alt.", 22 Dec. 1932 (holotype F; isotypes A, BM, G, GH, K, MICH, MO, NY, S, UC, US).

Drepanocarpus ? ovalifolius Pittier, Bol. Soc. Venez. Cienc. Nat.

7: 149. 1941. Type: E. G. Holt & W. Gehriger 242, Venezuela, Amazonas, Santa Barbara, delta of Río Ventuari, 100 m alt., 30 May 1940 (holotype VEN; isotypes GH, NY, S, US), non Machaerium ovalifolium Glaziou, nom. fere nud. 1906, nec Glaziou ex kudd 1972.

Machaerium venezuelense (Pittier) Hoehne, Fl. Brasílica 25(3): 53. 1941.

Machaerium longistipitatum Pittier, Bol. Tecn. Min. Agr. & Cria,

Caracas, no. 5: 119. 1944. Based on Drepanocarpus ? ovalifolius Pittier, non M. longistipitatum Hoehne 1939.

Flowers about 6-10 mm long, calyx 3-4 mm long, 2-2.5 mm in diameter; leaflets sericeous to sparsely pubescent with short-appressed hairs to subglabrous beneath, hairs fulvous or ferruginous; fruit alate, straight or slightly curved, wing usually 2-4 times the length of the seminiferous body.

Distribution: In moist forest at elevations from sea level to about 2000 mm southern Mexico to Colombia, Venezuela, Guianas, northern Peru, and Brazil.

Local names: Bohori bada (Guyana); chaperno (Venezuela); nansematoto (Brazil); neupinche (México); sangre de toro (Venezuela); uña de gavilan (Venezuela).

México: Oaxaca: Río Cascabel, Mell 2224 (NY, US). Veracruz: Cerro Cintepec, Sousa 3311 (MEXU). Sontecomapa, Sousa 3523 (A, MEXU, US). Santa Rosa, road San Andres Tuxtla to Acayucan, Schubert & Rojas 1856 (A).

Belize: Toledo: Temash R., Schipp 1361 (A, BM, F, G, GH, K, MICH, MO, NY, S). El Cayo: Gorge Creek section, Humming Bird Hwy., in cohune ridge at base of hill, Gentle 8694 (LL).

Guatemala: Izabal: Quiriguá, Standley 24259 (US). Puerto Barrios, Standley 25123 (US).

Honduras: Atlantida: Lancetilla valley, near Tela, Standley 52867 (F), 54692 (A, US), 55507 (A, F, US).

Costa Rica: Alajuela: Between Río Jesus and San Ramón, Brenes 17058 (F), 17133 (F, NY). San José: El General, Skutch 4152 (A, K, MO, NY, S, US).

Panamá: Canal Zone: Barro Colorado Island, Standley 41028 (US); Wetmore & Abbe 120 (GH); Croat 10093 (MO, US), 11176 (US). Colon: East Ridge, Luke 15275 (NY, UC).

Colombia: Chocó: Without exact locality, Fuchs 21754 (US). "Hoya del Río San Juan arriba de Palestina, entre Quebrada La Sierpe y El Quícharo," Forero et al. 4104 (MO). Magdalena: Near Las Nubes, H. H. Smith 2039 (BM, F, G, K, MICH, MO, NY, P, U, UC, US). Cuaco Mt., H. H. Smith 2040 (A, BM, BR, F, G, GH, L, MO, NY, P, S, US). Santander: Río Suratá valley, above Suratá, Killip & Smith 16600 (A, GH, K, NY, US). Meta: Villavicencia, woods along quebrada Cañabrava, Killip 34451 (BM, SP, US). Vaupes: Mitu, along lower Río Kubiýú, Zarucchi 1428 (SFV ex ECON).

Venezuela: Distrito Federal: Río San Pedro, Badillo 247 (VEN). La Quesera, middle Cotiza, above Caracas, Pittier 7134 (G, GH, SP, US, VEN). Quebradita de las Ruinas, near Caracas, Pittier 9459 (GH, NY, US, VEN). Miranda: Camino de Infiernito a Perico, Delgado 242 (US, VEN). Near Agua Fria, km. 26 on road from Caracas to Cúa, Pittier 11509 (K, US, VEN). In Mountains near El Pipe, Tamayo 2000 (VEN). Aragua: Near Colonia Tovar, Fendler 2318 (G, GH, GOBT, K, MO, NY). Yaracuy: Cerro Picacho, north of Nirgua, Steyermark & Bunting 97617 (NY, US). Apure: Reserva Forestal San Camilo, 6 km N of Río Mulita, Steyermark et al. 80397 (VEN), 101760 (NY, US, VEN). Lara: San Isidro, Tamayo 3363 (VEN). Tachira: Santo Domingo, airport, López-Palacios 1989 (US). Anzoátegui: Along Río Zumbador and tributary near base of Piedra Blanca, NE of Bergantín, Steyermark 61306 (F, VEN). Monagas: Base of limestone bluffs, Cerro de la Cueva de Doña Anita, S of and bordering valley of Caripe, Steyermark 61918 (F, MO, VEN). Amazonas: Alto Río Atacavi, Foldats 3775 (US, VEN). Río Orinoco, between Cerro Yapacana and Santa Barbara, Maguire et al. 42652 (G, K, MICH, MO, NY, R, US, VEN). Delta Amacuro: Boca Aragua, Gines 5142 (US). Caño Daudacana, Malave & Canales 26 (US).

Guyana: Without exact locality, Robert Schomburgk 108 (BM, K). Along Amakura R., Hitchcock 17635 (GH, NY, S, US). Morawhanna, Barina R., Hitchcock 17531 (GH, NY, US). Near Dadanawa, upper Rupununi R., de la Cruz 1443 (NY, US), 1513 (F, GH, MO, NY, UC, US). Pomeroun R., de la Cruz 3033 (F, GH, MO, NY, UC, US), 3086 (F, GH, MO, NY, UC, US), 3185 (F, GH, MO, NY, UC, US). Kamakusa, upper Mazaruni R., de la Cruz 4119 (F, GH, MO, NY, US). Mabaruma, Aruka R. Forest Dept. B. G. 5101, Fanshawe 2365 (K, NY, U, US), "edge of Euterpe swamp", Forest Dept. B. G. 5192, Fanshawe 2456 (K, NY, S, U, US).

French Guiana: Acarouany /Karouny/ Sagot 156 (K, P, W), 892 in part (F, NY, P, W). Cayenne, Sagot s. n. (BR, K).

Brazil: Without exact locality, Gomes s. n. (P). Roraima: Vicinity of Mucajai airstrip, Prance et al. 10976 (NY). Margin of Rio Mucajai, Prance et al. 11094 (K, MG, NY, US). Pará: Belém, Pires 51936 (NY, U, US); Moss 17 (US); Ducke 2030 (A, COL, IAN, MG, NY, K, SI, U, US); Burchell 9730 (K), 10082 (K, P). Belém, Tucunduba, beira do Rio Guamá, Black 52-14139 (IAN, NY). São Miguel do Guamá, beira do Irituia, Black & Foster 48-3361 (IAN, NY, US). Rio Branco de Obidos, Ducke /MG no/ 16949 (BM, F, F neg. ex B, G, MG, P, R, S, U, US, syntypes of M. decorticans). Caracará, Rio Branco, Ducke /RB no./ 24191 (SP). Amazonas: Galoruca, Rio Preto, region of Rio Negro, Frões 28310 (COL, IAN, US). Panure, Pires & Silva 7969 (IAN). Humaitá, Pires & Rose 13278 (IAN). Goiás: Between Anapolis and Belém, km. 1179, between Colima and Araguaima, Silva 57771 (K, NY, US).

Peru: Huanuco (?): Rio Yuyapichia, affluent to Rio Pachitea, Seidenschwarz 419/1 (SFV).

7b. MACHAERUM FLORIBUNDUM PARVIFLORUM Bentham, Jour. Linn. Soc. Bot. 4, suppl. 68: 1860; in Martius, Fl. Bras. 15(1): 254. 1862. Type: K. Spruce 4544, Peru, San Martín, Tarapoto, May 1856 (holotype K; isotypes BM, BK, C, F, F neg. 21862 ex C, G, GH, Goet, K, NY, NY, P, RB, W).

Lianas; flowers about 4-6 (-7) mm long, calyx 2-2.5 (-3) mm long, 1-2 mm in diameter, petals pale lavender, vexillum pubescent on the outer face; leaflets sericeous to moderately pubescent with appressed or subappressed fulvous or ferruginous hairs; fruit falcate-subreniform, bent at a right angle, about 6-8 cm long, the seminiferous body and wing about equal in length.

Distribution: In wet forest at elevations of about 100-1500 m, Perú, Bolivia.

Perú: Loreto: Forteleza, near Yurimaguas, Klug 2808 (A, BM, F, GH, K, MO, NY, S, US). Iquitos, horto dos subúrbios, Ducke /MG no/ 7499 (MG, SP). Puerto Almendros, Rio Nanay, above Iquitos, Gentry et al. 24887 (MO, SFV). Rio Nanay above Bellevista, McDaniel & Rimachi 18412 (MISSA, SFV). San Martín: San Roque, Ll. Williams 7400 (F).

Bolivia: La Paz: Mapiri region, San Carlos, Sarmpiuni, Buchtien 1781 (NY, US).

Bentham stated, "I can perceive no other difference than the smaller flowers". That seems to be the case unless the unusual fruit shape is characteristic of the variety as indicated above. The only collection with such short-winged, bent fruit is McDaniel & Kimachi 18412. Another collection from Peru, near the type locality, Ll. Williams 7400, has tiny, immature fruit, only about 5-6 mm long, that are straight. However, we cannot know what the mature size or shape would have been. Field study is needed. Yet another collection, Seidenschwarz 419/1 bears flowers in the size range of typical M. floribundum and has been cited under that variety.

7c. MACHAERIUM FLORIBUNDUM var. HYPARGYREUM (Harms) Rudd, *Phytologia* 24: 122. 1972.

Dalbergia hypargyrea Harms, *Notizbl. Bot. Gart. Berlin* 9: 973. 1926.

Type: G. Tessmann 4549, Peru, Loreto, "Oberer Marañon, Mündung des Santiago, flutfreier Hochwald," Nov. 1924 (holotype B destroyed, represented by F. neg. 2267 and fragment F ex B; isotypes F fragment ex G, G).

Lianas; flowers 4-5 mm long, calyx about 2 mm long, 1.5 mm in diameter, petals white, vexillum glabrous or lightly pubescent on the outer face; leaflets silvery sericeous beneath; fruit not known.

Distribution: In flood-plain forest, northern Loreto, Perú at elevations of about 280-350 m.

Perú: Loreto: Upper Río Marañon at mouth of Río Santiago, Tessmann 4705 (G isoparatype of D. hypargyrea). Río Corrientes at Ecuador border, between Teniente López and Puerto Avanzado, Gentry et al. 19071 (NY).

As noted under Machaerium lindenianum, Hoehne placed Dalbergia hypargyrea in synonymy under D. lindeniana (Benth.) Hoehne.

As is true of the other varieties this needs study. It may or may not be distinct from var. parviflorum, and it would be desirable to see fruit.

8. MACHAERIUM PARAENSE Ducke, *Arch. Jard. Bot. Rio de Janeiro* 3:

149. 1922. Lectotype: A. Ducke /MG no./ 16920, Brazil, Pará, Rio Tapajos, Bella Vista, on bank of Igarape, 14 Jan. 1918 (hololectotype MG; isolectotypes BM, F fragment and F neg. 28178 ex G, G, RB /as RB no. 11724/, SP fragment ex MG).

Trees, shrubs, or lianas, young stems tomentulose, glabrescent; stipules spinescent, recurved, about 2-3 mm long. Leaves 3-7-foliate, axis 4-18 cm long, pubescent with minute crispate hairs. Leaflets ovate to subelliptic, 4-15 cm long, 2-7 cm wide, usually darkening on drying, apex acuminate, base rounded to subcordate, upper surface glabrous, lower surface minutely strigose especially along the midvein or sometimes glabrous, secondary veins prominent, about 6-7 on each side, 5-25 mm apart, extending to the margin,

tertiary veins predominantly percurrent, oblique or perpendicular to the secondary veins. Inflorescences axillary or terminal, paniculate or somewhat fasciculate, axes minutely tomentulose; bracts deltoid, about 1-1.5 mm long; bracteoles elliptic to suborbicular, 5-5.5 mm long, 2-3 mm wide, ciliate, otherwise essentially glabrous. Flowers 9-10 mm long on pedicels 1-2 mm long; calyx ciliate, otherwise glabrous, about 4-5 mm long, 3 mm in diameter; petals lilac, vexillum pubescent on the outer face; stamens monadelphous or diadelphous 9:1 with the vexillar filament free. Fruit winged, glabrous, usually black when dry, 7.5-13 cm long including stipe 10-15 mm long, seminiferous body 2-3 cm long, 1.2-2 cm wide, wing 4-6 cm long, 2-2.7 cm wide.

Distribution: In forests along rivers on "terra firme", eastern Colombia, western Venezuela, northeastern Brazil, Surinam, and French Guiana, at elevations up to about 280 m.

Local name: Kô chiton (French Guiana, taxi-taki).

Without locality: "Hb. Rudge" (BM).

Colombia: Vaupés: Río Unilla, Calamar, Cuatrecasas 7322 (COL, US).

Venezuela: Zulia: Dtto. Bolívar, carretera Maracaibo-Tolosa-El Guanábano-El Consejo, entre Tolosa y km 4 al este de Tolosa, Bunting & Stoddart 8822 (US). Apure: Reserva Forestal San Camilo, Quebrada La Azulita, SW of San Camilo (El Nula), Steyermark et al. 101587 (NY, US, VEN).

Surinam: Gonini R., Versteeg 171 (U).

French Guiana: Opposite Colonia Agricola do Oiapoque, about 4 km N of mouth of Cricu R., Irwin & Westra 47491 (F, GH, IAN, K, MG, MICH, NY, U, US). Criques Ouaqui, Grande Ouaqui, Petite Ouaqui, Lemoine 7830 (MG, NY, P in part, U). Saut Tampac, banks of R. Campopi, affluent of R. Oyapock, Oldeman 2563 (IAN, P, US). Riviere Comté 0.75 km S of Cayenne, Oldeman 1227 (P, US). Between Maripasoula and Dégrad Roches, Schnell 11716 (P, US). Near Saut Macaque, bank of Grand Ouaqui, Schnell 12111 (NY, P, R, US).

Brazil: Amapa: Rio Pontanari, Irwin et al. 47283 (IAN, MG, NY, US). About 1-3 km N of Cachoeira Tres Saltos, Irwin et al. 48208 (IAN, MG, NY, U, US). Pará: Rio Xingú, region of Volta Grande between tributaries Ambé and Tucuruhy, Ducke /RB no./ 11637 (F neg. 18300 ex B, K, P, Rb, SP fragment ex RB, US isosyntypes).

Breves, Rio Macujubimzinho, Ducke /RB no./ 11638 (K, RB, S, U isosyntypes of M. paraense). Victoria, Rio Xingú, J. C. Kuhlmann 2032 /RB no./ 18196 (K, RB, S, U, US). Lageira, airstrip on Rio Maicuru, Strudwick et al. 3235 (SFV ex NY). Amazonas: Rio Negro, Barcelos, Maracá, Fróes 22073 (IAN, U). Rio Ituxi, vicinity of Boca do Curuquetê, France et al. 13995 (K, MG, NY, SFV, US).